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URBAN AND REGIONAL LAND USE ANALYSIS:
CARETS AND CENSUS CITIES EXPERIMENT PACKAGE

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SKYLAB/EREP INVESTIGATION NO. 469
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MONTHLY PROGRESS REPORT, SEPTEMBER, 1973

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a. Overall status, including problem areas and significant progress to date.

For the CARETS portion of this experiment, work concentrated on the analysis of aircraft thermal imagery (Mission 55M) flown for Baltimore, May 11, 1972. The data were processed by Environmental Research Institute of Michigan (ERIM) to produce computer-compatible tapes (CCT), video replay of imagery, and digital surface radiant temperature maps. Mission 55M was designed as a testing effort to develop procedures for handling Skylab 5192 data in the land use climatology experiment.

The problem faced was too much temperature diversity on the original maps. This necessitated a smoothing procedure for reducing the information content of the maps. The matrix of surface radiant temperature was smoothed 4 points by 4 lines which reduced the original data by a factor of 16. The smoothing program looks at a block of data 4 points by 4 lines on the original data and then computes the average block value. A decision was then made to filter blocked smoothed data recursively using a 3 x 3 sliding Gaussian filter. This type of filter does not reduce the amount of data but performs a running, weighted averaging of a 3 point by 3 line block of data. This computed averaged filter value is then assigned to the central data point. The recursion was performed 4 x and after each recursion, the maps were inspected to ascertain the decrease in information diversity. It was after the 4th smoothing with the Gaussian filter, an on line decision was made to stop the recursive smoothing operation. The visual map product was deemed satisfactory at this point.

Conversations during the month with Skylab project personnel indicate pessimism regarding ability of Johnson Space Center computers to produce thermal digital maps as users' products from the S-192 scanner. Therefore, some effort this past month was spent in attempting to develop procedures for the computer processing of the S-192 data tapes. Negotiations are in progress to develop in-house capabilities for computer processing and map production of the data tapes, or to have this operation contracted to an outside data processing firm.

No new data were received from Houston on SL-2; however, data were ordered in the form of CCT of bands, 2,4,6,8 and 13 and corrected film for the same bands for the above mission.

For the Census Cities portion of this experiment, work has concentrated on analysis of the Phoenix and Tucson SL-2 S-190a imagery. Of the eight urban test sites, these two are the likeliest to analyze first, because of status of our correlative control studies. The analysis of Phoenix is especially appropriate because of recent completion of manuscript studies showing 1970 land use at 1:62,500 as derived from 1970 high altitude photography. Also available are 1970 census tract data and map overlay, area measurements of these data and analysis and measurement of land use change 1970-72 (also from aircraft data). We have also delimited the urban area using Bureau of the Census density criteria but land use boundaries. Then we have mapped 1972 land use and urban delimitation on a 1:100,000 enlargement of the ERTS-1 May 10, 1973 scene. From this control data, analysis of the SL-2 imagery was begun. Valerie Milazzo is writing up the results for presentation at a news conference prior to the Skylab 4 launch on or about November 10. Her report will be part of the next monthly EREP progress report.

b. Recommendations concerning decision and/or actions required to ensure the attainment of the experiment's scientific objectives.

In a telephone report at time of splashdown of Skylab 3, we received word that S-190a and S-190b imagery now have been acquired for all eight mandatory urban test sites except S-190b (Earth Terrain Camera) coverage of San Francisco. We still have not seen any SL-3 imagery, but Dr. Wilmarth has promised to make copies available for Valerie Milazzo's review at Cape Canaveral on November 8 prior to the news conference. We emphasized the importance of getting S-190b coverage of San Francisco on Skylab 4. Of course, we also seek additional S-190a and/or S-190b coverage of Washington, Boston, New Haven, Cedar Rapids, Pontiac, Peoria, Tucson and Phoenix in order to pursue the land use change detection portion of the Census Cities Skylab experiment.

c. Expected accomplishments during the next report periods.

A large effort for the next reporting period will be channeled into completion of the technical report containing the analysis of the Baltimore thermal imagery. Also, a trip is planned to coordinate project tasks and exchange data with R. W. Pease, co-investigator at University of California, Riverside. Return via Lawrence Radiation Laboratory and University of California, Davis, is planned to discuss the climatic modeling phase of the land use climatology project.

d. Significant results and their relationship to practical applications or operational problems.

Review of results and applications of the Skylab SL-2 S-190a coverage of Phoenix is included in report by Valerie Milazzo to be presented at Cape Canaveral, November 8.

e. Summary outlook for the remaining effort to be performed.

The Census Cities work will pursue more comprehensive urban analysis, hopefully using SL-3 imagery.

f. Travel summary and plans.

Travel during the past month included a trip to Ann Arbor to: 1) consult with Professor Sam I. Outcalt and 2) work at ERIM on data processing (map smoothing) of the Baltimore thermal imagery (Mission 55M). A trip for John Lewis and Sam Outcalt has been planned from November 13 through 17 to California for the purposes expressed in section "c". Valerie Milazzo will represent the USGS CARETS and Census Cities experiment at the news conference on November 8, at time of launch of Skylab 4. From there, she will visit Skylab urban test sites (and co-workers) in Arizona.

Approved:

Robert H. Alexander

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